

024200

JPRS 84839

28 November 1983

USSR Report

ELECTRONICS AND ELECTRICAL ENGINEERING

No. 118

19990510 120

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

FBIS

FOREIGN BROADCAST INFORMATION SERVICE

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

4
37
A03

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

28 November 1983

USSR REPORT
ELECTRONICS AND ELECTRICAL ENGINEERING

No. 118

CONTENTS

ACOUSTICS SPEECH AND SIGNAL PROCESSING

- Input Signal Analyzer
(V. Bukatin, V. Golovkov; RADIO, No 8, Aug 83)..... 1

AEROSPACE AND ELECTRONIC SYSTEMS

- Attainable Accuracy of Distance Measurement in
Passive Radar
(V. A. Pon'kin, A. D. Romanov; RADIOTEKHNIKA I
ELEKTRONIKA, No 8, Aug 83)..... 2

ANTENNAS AND PROPAGATION

- Refraction of Radio Waves and Vertical Gradients of
Electron Concentration in Dayside Ionosphere of Venus
(I. E. Kalashnikov, et al.; RADIOTEKHNIKA I
ELEKTRONIKA, No 8, Aug 83)..... 3
- Methods of Forecasting Attenuation Statistics of 10-100 GHz
Radio Waves in Rains. Horizontal Ground Tracks
(M. A. Kolosov, et al.; RADIOTEKHNIKA I
ELEKTRONIKA, No 8, Aug 83)..... 3
- Effect of Motion of Optical Radiation Source on
Performance of Heterodyne Receiver Under Conditions
of Atmospheric Turbulence
(I. V. Obukhov; RADIOTEKHNIKA I ELEKTRONIKA,
No 8, Aug 83)..... 4
- Theory of Three-Dimensional Bifocal Antennas
(B. Ye. Kinber, et al.; RADIOTEKHNIKA I
ELEKTRONIKA, No 8, Aug 83)..... 5

Method of Wideband Matching of Radio Transmitter and Antenna (Yu. V. Zavrazhnov, et al.; RADIOTEKHNIKA, No 7, Jul 83).....	5
Optimization of Director Antennas (A. F. Chaplin, et al.; RADIOTEKHNIKA, No 7, Jul 83).....	6
BROADCASTING/CONSUMER ELECTRONICS	
Improving Performance Characteristics of R-250 M2 Radio Receiver (Yu. Kurinyy; RADIO, No 8, Aug 83).....	7
Better Vibration Proofing of Capacitor-Type Microphones (V. S. Bulatov; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 83).....	8
Method of Channel Coding for Recording and Transmission of Digital Television Signals (B. Ya. Smirnov; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 83).....	8
Glimpse of Future Television Centers (K. Z. Kochuashvili; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 83).....	9
SK-81 Code Synchronizer (G. F. Astaf'yeva, et al.; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 83).....	10
Adaptation of Current Planning Model to Real Conditions of Television Production (A. M. Gorizontov, et al.; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 83).....	10
Synthesis of Devices for Recordings of Television Images on Photographic Film By Method of Partial Storage (V. M. Semenov; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 83).....	11
Raster Holograms With Eliminated Discrete Structure (G. G. Golenko; TEKHNICA KINO I TELEVIDENIYA, No 8, Aug 83).....	12
CIRCUITS AND SYSTEMS	
Digital Temperature Compensation of Quartz Oscillators (A. N. Chistyakov; RADIOTEKHNIKA, No 7, Jul 83).....	13

Noise Generators With Arbitrary Distribution (A. S. Kucherov, G. A. Kucherov; RADIOTEKHNIKA, No 7, Jul 83).....	13
---	----

COMMUNICATIONS

Construction of Broad-Range (High-Speed) Systems for Digital Processing of Signals (Yu. N. Orlov; RADIOTEKHNIKA, No 7, Jul 83).....	15
Optimum Receiver of Weak Gaussian Optical Signals (A. A. Solodov; RADIOTEKHNIKA, No 7, Jul 83).....	16
Space-Time Processing of Signals in Field of Two-Component Interference (L. N. Kovalenko, et al.; RADIOTEKHNIKA, No 7, Jul 83).....	16

COMPONENTS, HYBRIDS AND MANUFACTURING TECHNOLOGY

Choice of Parameters of Digital-Analog System for Electrical Positioning Drive With Position Setter on Basis of Modular Optimum (Pavel Kharitonovich Kotsegub, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIK, No 7, Jul 83).....	17
Method of Producing Inductance Coils With High Stability (V. K. Gusel'nikov; RADIOTEKHNIKA, No 7, Jul 83).....	18

COMPUTERS

Information for Radio Hams About Microprocessors and Microcomputers: Display Module (G. Zelenko, et al.; RADIO, No 8, Aug 83).....	19
Memory Device Based on Reversible Counter (Oleg Aleksandrovich Petrov, Valeriy Valentinovich Semenov; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIK, No 7, Jul 83).....	20

ELECTROMAGNETIC COMPATIBILITY

Generalized Indicators of Electromagnetic Compatibility for Radioelectronic Equipment (A. R. Shvartsman; RADIOTEKHNIKA, No 7, Jul 83).....	21
--	----

ELECTRON DEVICES

Frequency Multiplication by Schottky-Barrier Diodes on Short Side of Millimetric Range of Wavelengths (S. V. Averin, et al.; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 83).....	22
---	----

Optoelectronic Means of Supplying Information to Power Plant Inspection and Control Systems (N. P. Udalov, V. I. Busurin; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA, No 6, Jun 83).....	23
---	----

MICROWAVE THEORY AND TECHNIQUES

Propagation of Surface Waves Through Plane Gradiantal Waveguides With Irregular Segment (I. P. Rudenok; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 83).....	24
--	----

Microwave Modulator With MDS-Structure With InSb Films (V. V. Gusakov, L. I. Kats; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 83).....	24
--	----

Code Lock Built With Microcircuits (B. Kalmykov; RADIO, No 8, Aug 83).....	25
---	----

POWER ENGINEERING

Performance and Service Indicators of 110/750 kV Substations in USSR Power Systems (V. A. Ovseychuk, V. Ye. Shesteren'; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA, No 6, Jun 83).....	26
---	----

SONICS & ULTRASONICS

Controlled Generator of Ultrasonic-Frequency Signals (Boris Petrovich Ryazanov, Inna Dmitriyevna Bystrova; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA, No 7, Jul 83).....	27
--	----

NEW ACTIVITIES, MISCELLANEOUS

Change in Parameters of Medium Inside Nuclear Reactor Containment Upon Inrush of Coolant (V. V. Fisenko, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA, No 6, Jun 83).....	28
--	----

Mechanisms of Flicker Noise in Josephson Junctions (A. N. Vystavkin, et al.; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 83).....	29
--	----

Eighteenth All-Union Conference on Emission Electronics (V. V. Korablev; RADIOTEKHNIKA I ELEKTRONIKA, No 8, Aug 83).....	29
--	----

For the Hungarian People's Army (Laios Kiss; RADIO, No 8, Aug 83).....	30
---	----

ACOUSTICS SPEECH AND SIGNAL PROCESSING

INPUT SIGNAL ANALYZER

Moscow RADIO in Russian No 8, Aug 83 pp 28-29

BUKATIN, V. and GOLOVKOV, V., Kazan

[Abstract] An automatic analyzer of input signals to light-dynamics equipment is described which identifies the input control signal as music or speech on the basis of the slope of its envelope. False processing of the time characteristics of either kind of signal can occur only when both appear simultaneously. The analyzer consists of a band filter (1500 Hz cutoff), a low-pass filter (250 Hz), a logarithming circuit, and amplitude detector, another low-pass filter (50 Hz), a differentiator, a comparator (Schmitt trigger), and an analog memory following one another. The two input filters and the logarithming circuit are operational amplifiers. This analyzer is connected between the electronic tumbler switch behind the automatic gain control, the input stage of the light-dynamics module, and the filter bank in that module followed by sound and light tracking components. A magnetic tape recorder with alternating music and speech fragments prerecorded on the tape is connected to the input of this analyzer, after the components of the latter have been tuned. The probability of false signal processing decreases with increasing length of analysis, the optimum length of time being within the 0.4-0.8 s range. Figures 3.

[3-2415]

UDC 621.396.67.01

ATTAINABLE ACCURACY OF DISTANCE MEASUREMENT IN PASSIVE RADAR

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 17 Jun 82) pp 1660-1661

PON'KIN, V. A. and ROMANOV, A. D.

[Abstract] Passive radio detection and ranging of targets which emit radiation is based on processing the information contained in the wavefront structure of the aperture of a continuous or discrete receiver antenna array. The attainable accuracy of distance measurement is usually determined by the instant of signal arrival at the center of the antenna or at any one of the array elements, when processing of the signal begins. The attainable accuracy of distance measurement also depends on the indeterminacy of the instant of signal emission by the source. The corresponding dispersion of the distance estimate and the resulting error of distance measurement are calculated here for a horizontal rectangular antenna array. The accuracy is found to improve when the signal is received at discrete points in the antenna aperture, three points being the minimum number necessary for measurement of the radius of the wavefront curvature. References: 5 Russian.

[2-2415]

UDC 621.371:523.42

REFRACTION OF RADIO WAVES AND VERTICAL GRADIENTS OF ELECTRON CONCENTRATION IN
DAYSIDE IONOSPHERE OF VENUS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 15 Jun 82) pp 1457-1465

KALASHNIKOV, I. E., MATYUGOV, S. S., YAKOVLEV, O. I. and YAKOVLEVA, G. D.

[Abstract] On the basis of data which have been obtained by the space probes "Venera-9" and "Venera-10", using decimetric radio waves (wavelength $\lambda = 32$ cm), the refraction characteristics of the dayside ionosphere of Venus are calculated, assuming this medium to be a spherically symmetric one. The dependence of the refraction angle on the impact parameter, with the aid of the Abel transformation, yields the vertical gradient of the refractive index. The amplitude data also yield the vertical gradient of electron concentration, an important characteristic of any ionosphere. The results indicate a high stability of refraction effects and a soft peak of electron concentration in that ionosphere. The results are characterized by a high degree of repeatability, with a predictable error at every point along the altitudinal profile, and by a close agreement with results obtained by the method of dispersion interferometry. Figures 3; tables 2; references 17: 10 Russian, 7 Western.
[2-2415]

UDC 621.372.029.65:519.2

METHODS OF FORECASTING ATTENUATION STATISTICS OF 10-100 GHz RADIO WAVES IN
RAINS. HORIZONTAL GROUND TRACKS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 7 Jul 82) pp 1466-1479

KOLOSOV, M. A. [deceased], POZHIDAYEV, V. N. and RUKINA, A. N.

[Abstract] Four models developed by different authors for weather forecasting in various countries are considered for calculating the statistical-mean probability of radio wave attenuation in rain. They are the P, Misma - J. Fimbel model (AMM. TELECOMM. Vol 20, Nos 5-6, 1975 pp 149-158), the

K. Morita model (REV. ECL Vol 24, Nos 7-8, 1976 pp 651-658), the S.H. Lin model (BELL SYSTEM TECH. J. Vol 54, No 6, 1975 pp 1051-1086), and the "uniform rain intensity" model. The first of these models has yielded the closest agreement with readings taken along horizontal ground tracks. According to this model, the possible magnitude of attenuation along a track, with the $A_{\min} - A - A_{\max}$ range is calculated from three parameters of the log-normal distribution of rainfall probability at a given location along the track. Its algorithm has been subsequently modified so far as defining the lower limit of integration, calculating the probability of a rain cell falling onto the track, and calculating the zone width around the track within which a rain cell can be found. This modification of the M-F model was used to evaluate the rainfall characteristics of various regions of the USSR, using 10-100 GHz radio waves, the most typical localities being Yaroslavl, Makhindzhauri, and lake Balkhash. Original pluviographic data and resulting integral attenuation curves are shown which characterize the meteorological conditions in these three and a few other localities. Figures 5; tables 7; references 18: 5 Russian, 13 Western. [2-2415]

UDC 621.396.62.029.7:551.511.6

EFFECT OF MOTION OF OPTICAL RADIATION SOURCE ON PERFORMANCE OF HETERODYNE RECEIVER UNDER CONDITIONS OF ATMOSPHERIC TURBULENCE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 19 Sep 80, after correction 29 Sep 82) pp 1536-1539

OBUKHOV, I. V.

[Abstract] The effect of atmospheric turbulence on the signal in an intermediate-frequency optical heterodyne receiver from a moving source of optical radiation is noise in the form of amplitude and phase fluctuations. For the purpose of analysis, these fluctuations are represented as uniform stationary random fields. This is correct only within sufficiently short time intervals corresponding to sufficiently small displacements of the source. The thickness of the turbulent layer as well as the distance from source to receiver and the transverse component of the source velocity can be assumed to remain constant during such time intervals. Both the fluctuation spectrum and the altitudinal profile of the refractive index are approximated with conventional relations for a characteristic refractivity parameter. Calculations reveal that, in the case of a moving source and a stationary turbulent layer, the pattern of signal fluctuations in the receiver depend largely on the form of the altitudinal profile. When the profile has no peak or has a soft peak, these fluctuations are then essentially determined by the coherence radius of the radiation and the transverse velocity of the ray of vision. When the profile has a sharp peak, these fluctuations are then essentially determined by the receiver aperture and they approach the fluctuations due to shifting of the turbulent layer at constant velocity. References 6: 5 Russian, 1 Western. [2-2415]

THEORY OF THREE-DIMENSIONAL BIFOCAL ANTENNAS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 12 Feb 82) pp 1509-1517

KINBER, B. Ye., KLASSEN, V. I. and STEBLIN, V. I.

[Abstract] The problem of focusing, namely transformation of two diverging spherical waves into two converging ones, is solved for three-dimensional bifocal antennas of the mirror type and the lens type. With the initial condition for the surface stipulated as a strip, calculations based on geometrical optics yield a smooth solution and, accordingly, mathematically feasible and technically producible surfaces. Effects limiting the physical feasibility of these mirror and lens surfaces are creasing and mutual shadowing. Moreover, with an aplanatic surface assumed as the initial one, the solution for a mirror will be discontinuous and physically meaningless. Figures 5; references 11: 5 Russian, 6 Western.
[2-2415]

UDC 621.372.43

METHOD OF WIDEBAND MATCHING OF RADIO TRANSMITTER AND ANTENNA

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received, after completion, 6 Jan 83) pp 29-30)

ZAVRAZHNOV, Yu. V., MESHCHERYAKOV, Ye. Ya. and SHANIN, V. A.

[Abstract] A method for wideband matching of a radio transmitter and its antenna is proposed which avoids the use of tunable or fixed mechanical or electronic devices and thus ensures high speed as well as high reliability and accuracy. A fixed four-pole impedance network is connected across the output of the transmitter amplifier. The stringent constraint of minimum deviation from precisely set nominal reactance and resistance values is relaxed by widening the range of allowable amplifier output impedance. The range of this impedance is established on the basis of an analysis of amplifier performance under matched and mismatched loads. Deviation from optimum load impedance is, over a wide but not unlimited range, compensated by automatic regulation of the amplifier input voltage on the basis of current feedback. Validity and feasibility of this method were demonstrated experimentally on a power amplifier with KP904A or bipolar transistors operating in the 30-40 MHz frequency range, delivering a power of 9.7 W to a 75-ohm load under nominal conditions and not less than 7.1 W as the VSWR varied from 2 to 4.2 at some frequencies. Figures 1; references: 3 Russian.
[302-2415]

OPTIMIZATION OF DIRECTOR ANTENNAS

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received, after completion, 15 Jan 83) pp 79-82

CHAPLIN, A. F., BUCHATSKIY, M. D. and MIKHAYLOV, M. Yu.

[Abstract] The performance characteristics of ultrashort-wave director antennas are evaluated theoretically, assuming that the array consists of thin cylindrical vibrators. The directive gain is calculated from the solution to the system of equations of current distributions in the array elements, after this system has been reduced to one of the linear algebraic Kirchhoff equations. The design of such an antenna is then optimized for maximum directive gain G under constraints on the number of array elements N , the vibrator length $2l_i$, and the distance d_i between adjacent vibrators, as well as on the total antenna length. This optimization problem reduces to one of mathematical programming for minimization of the functional $F(X) = \frac{1}{G(X)} + \sigma f(X - Y)$ (X - vector of optimizable parameters l_i and d_i , Y - vector of allowable l_i and d_i values, $f(X - Y)$ penalty function, σ - penalty coefficient, $F(X - Y) = 0$ when X is within tolerance field). The calculations have been programmed in FORTRAN for a BESM-6 high-speed computer. Results are shown for director antenna arrays of 15, 4, and 3 elements respectively, the data including the optimum dimensions as well as the directive gain and bandwidth. Figures 3; tables 1; references 11: 3 Russian, 8 Western.

[302-2415]

IMPROVING PERFORMANCE CHARACTERISTICS OF R-250 M2 RADIO RECEIVER

Moscow RADIO in Russian No 8, Aug 83 pp 17-19

KURINYY, Yu. (UA9ACZ), USSR Sports Master in International Class, Chelyabinsk

[Abstract] It is possible to improve the performance characteristics of the R-250 M2 radio receiver used by short-wave hams. A few modifications will widen the dynamic range, minimize the set noise, increase the selectivity, and provide better automatic gain control. This requires two electromechanical filters and one calibrated variable capacitor. It is further necessary to replace the overloaded 6Zh9P tube in the first stage of the UHF amplifier with a 6K13P tube and match the latter to the high-efficiency antenna. Manual gain control is connected into the cathode circuit of the second stage and automatic gain control is connected into the control grid circuit, with the initial gain level preset by means of a parallel resistor at the output end. The set noise in the amplifier of the second intermediate frequency is lowered by decreasing the number of stages to two and replacing the main tuning filter with an electromechanical one (center frequency 215 kHz, bandwidth 3 kHz) and connecting another such filter at the output of this amplifier. Each of these filters is tuned by means of a variable capacitor in parallel with the input inductance, one with a 100-1000 pF range for the first filter and one with a 12-500 pF range for the second filter. The receiver with these modifications is calibrated with oscillator signals at 14,000 and 14,020 kHz. Its dynamic range should be 80 dB when "swamped" and 116 dB at a ± 10 kHz frequency deviation when the input sensitivity is 0.3 μ V, 47 dB when the input sensitivity is 0.5 μ V. All the work can be done in two days. Figures 7.

[3-2415]

BETTER VIBRATION PROOFING OF CAPACITOR-TYPE MICROPHONES

Moscow TEKHNIIKA KINO I TELEVIDENIYA in Russian No 8, Aug 83 pp 9-13

BULATOV, V. S., Central Design Office of Cinematography, "Ekran" Scientific-Industrial Association.

[Abstract] Dampers for protection of microphone operating in the 0.02-20 kHz frequency range must have a "soft" elasticity characteristic for vibration proofing (natural frequency 8-12 Hz) and a "stiff" elasticity characteristic for shock proofing (natural frequency 22-35 Hz). Reconciliation of these contradictory requirements and tradeoff can be achieved by dampers with variable parameters such as a pneumatic one. Here, either the gas pressure inside the shell or the effective area of the working surface are varied. The performance of such a damper, a gas-filled shell of revolution holding the microphone, is established on the basis of the corresponding equations of equilibrium (Laplace equation for elastic shell with latitudinal and meridional stresses under internal pressure), gas thermodynamics, and motion. The 20A157 damper for a capacitor-type microphone, designed and built on this basis with the aid of nomograms, maintains it in a stable position even when the center of gravity and the geometrical center do not coincide. The damper has been designed so as to influence to the minimum the frequency characteristic and the radiation pattern of the microphone. It also includes regulation of its resonance frequency. The damper is simply constructed and easily manufactured. It was vibration and shock tested. Absence of a "string" effect in mounting brackets and short attenuation time compare it favorably with the preceding 20A105 model as well as with "Electro-Voice" (U.S.) 309, DL42 models and the "Neumann" (FRG) EA89 model. Figures 6; tables 1; references: 6 Russian. [300-2415]

METHOD OF CHANNEL CODING FOR RECORDING AND TRANSMISSION OF DIGITAL TELEVISION SIGNALS

Moscow TEKHNIIKA KINO I TELEVIDENIYA in Russian No 8, Aug 83 pp 52-53

SMIRNOV, B. Ya.

[Abstract] Channel coding for magnetic recording and storing of data in digital integrated communication networks of subscriber cable TV systems, which will eventually use fiber optics for data transmission, must ensure adequate interference immunity and bit-packing density. Other requirements are fast and accurate locking into synchronism, preferably at the line frequency, as well as the possibility of transmission over a single channel and transmission of auxiliary data. Partitioned coding of a standard digital television signal and the corresponding code conversion are shown, this method being particularly

suitable for high-density magnetic recording with channel phasing. In 8/10 coding, specifically, it is feasible to convert 8-bit words to 10-bit words by means of a single-microcircuit 250x10 read-only memory and to convert 10-bit words to 8-bit words by means of a single-microcircuit 1024x8 read-only memory. Other equipment for the process includes a shift register, a binary-to-MNRZ code converter, a differential amplifier, a low-pass filter, a subtractor, a null detector with short-pulse shaper, a discriminator, a storage element, a voltage-controlled oscillator, a byte synchronization decoder, a decoder of the 16th byte, a byte counter (up to 1728 bytes), a bit counter (up to 10 bits), an inhibitor, a trigger, and a direct-access memory with two addressing systems. Figures 2; references 8: 2 Russian, 6 Western (1 in Russian translation).

[300-2415]

UDC 621.397.61.006"313"

GLIMPSE OF FUTURE TELEVISION CENTERS

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 8, Aug 83 pp 41-47

KOCHUASHVILI, K. Z.

[Abstract] Basic foundations for future television centers are already laid out to day in research laboratories of the industry, the development trends being based on reconciling what is desirable with what is possible. These major trends include introduction of computer techniques, using minicomputers with adequate memory capacity, and conversion from analog to digital television signals. Attendant tasks are development of an international coding standard and language, and development of digital components for studio and broadcast stations. An associated problem is that of widening the frequency band for signal transmission. Some applications of digital minicomputers are synthesis of characters for captioning, phase correction and standard conversion, video and audio recording, preferably on magnetic disks rather than on magnetic tapes, and centralized synchronization. New features becoming available are the electronic pencil (electronic "artist") and televising of printed texts. Data banks, data input and output devices, and programming hardware are being designed to meet the requirements. Full implementation should not be expected before the beginning of the next century. Figures 5.

[300-2415]

SK-81 CODE SYNCHRONIZER

Moscow *TEKNIKA KINO I TELEVIDENIYA* in Russian No 8, Aug 83 pp 54-55

ASTAF'YEVA, G. F., GOZBENKO, V. P., TSYKALO, N. D. and YARKOV, V. S.,
Korovgrad Radio Components Manufacturing Plant

[Abstract] A code synchronizer serves for automatic synchronization of any TV signal with the reference sync generator and facilitates blending of nonsynchronous incoming video signals with the overall TV program. The SK-81 frame synchronizer, developed at the Kirovograd plant, stores a nonsynchronous signal and then reads it out synchronously. The input signal enters after it has been converted from analog to digital in a binary code. Coding the entire color signal is preferable in order to separate coding of its components, inasmuch as a smaller memory is required. The time delay of the input signal, proportional to the phase mismatch between input signal and synchronizing field and line pulses from the reference sync generator, is controlled by means of an electronic frame memory. Other components of the SK-81 device include a digital-to-analog converter, a recording generator, a readout generator, and a power supply. The frame memory with random sampling is built on a series K565 microcircuit, the digital-to-analog converter consists of series K500 microcircuit switches and a R-2R arrays of precision resistors. The analog-to-digital converter is a 6-bit 1107PV1 parallel one. The device has a uniform amplitude-frequency characteristic within the 0.5-0.6 MHz range, within $\pm 3\%$ of the amplitude at 1 MHz, a transient overshoot of 5% and a transient period of 100 ns. Nonlinear distortions do not exceed 3% ("differential gain") and 3° ("differential phase"). Signal-to-noise ratio and signal-to-hum ratio are both 50 dB. Figures 1; tables 1.

[300-2415]

ADAPTATION OF CURRENT PLANNING MODEL TO REAL CONDITIONS OF TELEVISION PRODUCTION

Moscow *TEKNIKA KINO I TELEVIDENIYA* in Russian No 8, Aug 83 pp 47-49

GORIZONTOV, A. M., LISOGURSKIY, V. I., LUKIN, M. I., MALESHKO, V. N.,
CHERVINSKAYA, V. A. and SHKLYAR, L. A., Leningrad Institute of Electrical
Engineering of Communications imeni M. A. Bonch-Bruyevich

[Abstract] A model for simulation of current television production planning was constructed earlier (*TEKNIKA KINO I TELEVIDENIYA* No 7, 1980 pp 25-27) and subsequently updated (*TEKNIKA KINO I TELEVIDENIYA* No 10, 1981 pp 48-50). A recent study made for the purpose of correlating this model with actual television production in the Leningrad and Tbilisi centers revealed some inadequacies of the planning algorithm and a need for its adaptation to the real world. Major modifications were made accordingly in figuring the length

of the preparation period (adjustment of lighting, warm-up of electronic equipment) and in the method of equipment selection for any one of the three groups of operations (those to be performed at specific instants of time, those with timing flexible within given periods of the day, those with completely flexible timing). The strategy of sequencing was revised to a back-tracking one, with each last operation referred to the latest time period. The veracity of this model can be further improved by parametric adaptation to specific items in requisitions coming from television centers with different broadcasting capabilities. Calculations according to this model with optimum values of the adaptable prioritization function in as many as 10 different variants have yielded a realistic schedule of equipment utilization in a large television center. References: 3 Russian. [300-2415]

UDC 778.5:621.397.13

SYNTHESIS OF DEVICES FOR RECORDINGS OF TELEVISION IMAGES ON PHOTOGRAPHIC FILM BY METHOD OF PARTIAL STORAGE

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 8, Aug 83 pp 38-40

SEMENOV, V. M., All-Union Scientific-Research Institute of Television

[Abstract] The two known variants of devices for recording television images on photographic film by the method of partial storage are characterized by the ratio of the camera shutter closing time t_{sh} to the kinescope screen (phosphor coating) afterglow time constant θ . In the first variant this ratio is selected so as to allow a slight nonuniformity of blackening density in order to minimize that time constant θ . The key factor in synthesis of such a device on the basis of this criterion, and the corresponding relation for film exposure distribution and blackening density distribution on the negative, is to ensure a smooth rather than an abrupt nonuniformity, considering that the eye is much less sensitive to a smooth one. In the second variant of these recording devices the nonuniformity of blackening density is eliminated by means of precorrection, assuming that neither the ratio t_{sh}/θ and the time constant θ , nor the contrast ratio on the characteristic curve depend on the swing of the television signal but all are constant within a given scan line. One method of precorrection, feasible only when the maximum kinescope brightness exceeds the brightness necessary for nominal exposure and blackening density, is the introduction of an appropriately varying precorrection video signal. A device proposed for this purpose consists of a pulse shaper driven by a synchronizing field and line pulses, a reprogrammable storage, a digital-to-analog converter, and a voltage-controlled signal level (swing) regulator. Another method of precorrection is use of a neutral filter with variable cross section. Figures 4; references 6: 4 Russian, 2 Western (1 in Russian translation). [300-2415]

RASTER HOLOGRAMS WITH ELIMINATED DISCRETE STRUCTURE

Moscow TEKHNICA KINO I TELEVIDENIYA in Russian No 8, Aug 83 pp 31-37

GOLENKO, G. G., All-Union Scientific-Research Institute of Cinematography

[Abstract] Elimination of the discrete structure from raster holograms of natural objects makes it possible to increase the resolution, which then does not depend on the raster period. The characteristics of an image reconstructed from a raster hologram, while determined largely by those of the original image, differ from those of a lens-raster image seen by the naked eye. Here the characteristics of both images are evaluated comparatively on the basis of corresponding models describing the geometrical relation between eye, raster hole, and object. The need to transfer an integral image to a continuous holographic one for reproduction purposes (printing) is dictated by both technical and economic considerations, elimination of the discrete structure becoming an important factor in this process. This elimination during reconstruction of a hologram with noncoherent light involves, in effect, separation of the useful image from the raster image. This is possible because the width of the scattering circle around an image point depends on its distance from the base plane, but a residual variation of light intensity within the field of vision will remain. At some threshold the raster structure becomes invisible, which corresponds to the Lippman defocusing criterion. This threshold, determined by the combined role of all elements in the original object image, in turn determines the resolution and the frequency-contrast characteristic of the raster holographic image. The elimination method developed at the All-Union Scientific-Research Institute of Cinematography (NIKFI) involves first separating in space the plane of the large-aperture object image from the raster plane during the lens-raster filming stage and then superposing the base plane of the real integral image, reconstructed by an objective in the return path of light rays, on the plane of the hologram during printing. This process can be optimized by matching the angular resolution of the image with the angular resolving power of the eye. Figures 6; references 22: 19 Russian, 3 Western (1 in Russian translation).
[300-2415]

UDC 621.373

DIGITAL TEMPERATURE COMPENSATION OF QUARTZ OSCILLATORS

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received, after completion, 2 Dec 82) pp 54-56

CHISTYAKOV, A. N.

[Abstract] Thermal stability of the frequency of quartz oscillators is conventionally achieved by means of thermostats or temperature compensators with a time stability which is usually much lower than that of the oscillator parameters. More effective is compensation by means of a quartz resonator as a temperature transducer with conversion of temperature readings to digital signals. Such a conversion is effected through comparison of the frequencies of two oscillators containing resonators with sufficiently different and precisely reproducible temperature-frequency characteristics. Most suitable for this are AT-cut and BT-cut quartz crystals, which satisfy all requirements and also age very slowly. The basic comparator-compensation circuit, as well as approximation of both ends bounding the monotonic range of the temperature dependence of counter readings, can be modified to fit any particular application. A more intricate scheme for temperature compensation of a frequency synthesizer with a quartz oscillator as a reference generator includes a transducer of reference time intervals. Figures 2; references: 5 Russian. [302-2415]

UDC 621.373.5

NOISE GENERATORS WITH ARBITRARY DISTRIBUTION

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received, after abridgment, 11 Jan 83) pp 40-42

KUCHEROV, A. S. and KUCHEROV, G. A.

[Abstract] The feasibility of using a generator of pseudorandom binary numbers noise generator with arbitrary distribution is analyzed, on the premise that noise with normal distribution can be generated by summation of the signals from all register cells. With all numbers from 1 to $2^n - 1$ at the register

output being equiprobable, the problem reduces to approximating the inverse of the desired noise distribution function and calculating the weight factors. A linear combination of Rademacher functions with an extra constant component is considered first as the best approximation and applied to a Rayleigh noise. These functions form an incomplete system, however, so that exact series expansion is possible only for linear distribution functions. The accuracy for other distributions is then improved by adding Walsh functions which form a complete system whose first 2^n members are definitively related to n Rademacher functions, and adding the corresponding signals by means of additional modulo-2 summation devices. Figures 3; references 8: 6 Russian, 2 Western (1 in Russian translation).
[302-2415]

CONSTRUCTION OF BROAD-RANGE (HIGH-SPEED) SYSTEMS FOR DIGITAL PROCESSING OF SIGNALS

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received 21 Dec 82)
pp 56-57

ORLOV, Yu. N.

[Abstract] Construction of a system for digital processing of signals in real time with a finite selection of standard devices is described, the procedure allowing such a system to be transformed into another one with a different sequence of connections, a different components list, or a different number of components. The system consists of several processing devices or modules, a control module, and a computer. The conveyor principle is applied to data processing within each module as well as to data transfer from one module to another. The four processing modules are: 1) cascade processor of fast Fourier transformation (up to 4096 complex-variable readings), with or without scaling; 2) calculator and storage of energy spectra; 3) visual indicator with two displays, one for entire spectrum (up to 4096 harmonics) and one for segment of the spectrum (256 harmonics); and 4) 2-channel 8-bit analog-to-digital converter. The control module is a standard USS OSh/2K gang matching device. Signals are processed in two modes. In the "system" mode, signals enter a module directly and are processed in real time, the data input being synchronized from an external source. In the second mode, data are processed after having been prestored in the computer, with any module serving as a peripheral device. The second mode can be used for accelerated processing of stored data, for repeated processing of input signals according to other algorithms not provided in a given variant of the system, and for testing individual modules or the entire system. The system operates with an SM-4 control computer complex. Figures 1.

[302-2415

OPTIMUM RECEIVER OF WEAK GAUSSIAN OPTICAL SIGNALS

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received 28 Jan 83)
pp 86-88

SOLODOV, A. A.

[Abstract] The optimum receiver of weak optical signals in a Gaussian optical field is determined on the basis of the concept of threshold detection, with the likelihood functional expanded into a power series in the small signal-to-noise ratio, and considering that the photodetector output current depends statistically on the intensity of incident optical radiation. The algorithm of the receiver operation is constructed in accordance with testing of two hypotheses, with the assumption that an additive Gaussian white noise modulating the thermal noise in the photodetector also appears at the photodetector output. References 3: 1 Russian, 2 Western.

[302-2415]

SPACE-TIME PROCESSING OF SIGNALS IN FIELD OF TWO-COMPONENT INTERFERENCE

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received 9 Jan 83)
pp 70-75

KOVALENKO, L. N., KRASNYY, L. G. and SKRIPKA, N. I.

[Abstract] An optimum receiver is synthesized for space-time processing of a signal $s(t + \alpha x)$ which appears with both fluctuation interference and reverberation interference. The synthesis is based on considering Gaussian interference with an arbitrary correlation function and then introducing a discrete antenna with correspondingly n space channels. A comparative performance evaluation of the resulting optimum receiver and a nonoptimum receiver with separate space and time processing reveals that the interference immunity of both is almost the same in the case of predominant fluctuation interference. The advantage of the optimum receiver increases with increasing reverberation interference, becoming maximum when both transmitter and receiver antennas are of equal lengths, but does not significantly depend on their actual length.

Figures 3; references: 5 Russian.

[302-2415]

CHOICE OF PARAMETERS OF DIGITAL-ANALOG SYSTEM FOR ELECTRICAL POSITIONING DRIVE WITH POSITION SETTER ON BASIS OF MODULAR OPTIMUM

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 7, Jul 83 pp 102-107

KOTSEGUB, PAVEL KHARITONOVICH, candidate of technical sciences, dotsent; GUBAR', YURIY VLADIMIROVICH, graduate student; and TOLOCHKO, OL'GA IVANOVNA, candidate of technical sciences, senior instructor, all of Donetsk Polytechnic Institute

[Abstract] A rectified-d.c. electrical positioning drive with digital position setter and analog linear velocity regulator is considered, the design objective being to ensure the optimum (from standpoint of maximum response speed) changing of position under upper-bound constraints on angular velocity and acceleration. The problem is formulated in terms of requiring that the value of the discrete position function $S^*(nT)$ at instant of time nT be equal to the desired value of the continuous position function $s^*(t)$ at this instant. The problem is solved by appropriately accelerating, uniformly moving, and decelerating. Different algorithms are used for these three steps of such a cycle: the trapezoidal rule for motion at constant acceleration or deceleration and the Euler rule for motion at constant velocity. Solution of the design problem involves level quantization and time discretization, with the digital-analog system regarded as a linear pulse-transmission system in the first approximation and with introduction of two corrective compounding feedback loops. The optimization problem for the transfer function in z-transform domain is solved graphonumerically for convenient performance evaluation and transients analysis. Figures 4; references: 6 Russian.
[299-2415]

METHOD OF PRODUCING INDUCTANCE COILS WITH HIGH STABILITY

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received 2 Dec 82)
pp 91-92

GUSEL'NIKOV, V. K.

[Abstract] A method is proposed for producing inductance coils with a low temperature coefficient of inductance, which will ensure high stability and high Q in a severe environment. The bobbin is produced by winding 40-50 layers of glass fiber at a 45° angle on a nonadhesive sleeve and impregnating the structure with a polymer compound. Wire is wound on this bobbin and on top of the wire another 40-50 layers of glass fiber. Subsequent heat treatment results in polymerization of the compound and in a monolithic vibration-resistant coil which can be slipped off the nonadhesive arbor. The Q-factor and the temperature coefficient of inductance will depend respectively on the dielectric properties of the glass fiber and on its coefficient of linear thermal expansion. Up to $Q=100$ and a TCI as low as $2 \cdot 10^{-5} \text{ }^{\circ}\text{C}^{-1}$ are attainable by this method, according to an experimental production lot and laboratory measurements over the 20-60 °C range. Figures 1; tables 1; references: 3 Russian.
[302-2415]

COMPUTERS

INFORMATION FOR RADIO HAMS ABOUT MICROPROCESSORS AND MICROCOMPUTERS: DISPLAY MODULE

Moscow RADIO in Russian No 8, Aug 83 pp 26-27

ZELENKO, G., PANOV, V. and POPOV, S.

[Abstract] The microcomputer software for programming the display module for radio hams (RADIO No 7, 1983 pp 23-27) and the keyboard hardware are described, codes VK and PS controlling the pointer movement according to a special subroutine. That subroutine includes testing an incoming code as to whether it is a control code or the code of an alphanumeric symbol. In the former case the pages in the direct-access memory remain unchanged and only the contents of a "pointer position" memory cell are changed, with a shift of "1" to the corresponding cell. In the latter case the code is immediately recorded in the "page" cell of the direct-access memory. The keyboard for the display module has been designed for a maximum degree of both simplicity and universality, in order to be usable with almost every kind of contact devices. It consists of a 7x8 array of normally open contactors and a separate group of 3 contactors. It is capable of coding all Russian and Latin letters, Arabic numerals, punctuation marks, and whatever graphic symbols are listed. An interlock is provided which protects against simultaneous depression of two or more keys in the array and a resulting flutter of contactors. When a key in the array is depressed, any of these codes will be formed depending on which of the three separate keys has also been depressed (Russian letter, control of graphic symbol, special symbol). Code modifying keys operate through RS-triggers. The keyboard is interfaced with the microcomputer through a 3-channel KR580VV55 solid-state module, with 8 diodes protecting the data output channel against damage in case several keys are simultaneously depressed. Figures 2; tables 1. [3-2415]

MEMORY DEVICE BASED ON REVERSIBLE COUNTER

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 7, Jul 83 (manuscript initially received 19 Mar 81; after completion 14 Oct 82) pp 74-77

PETROV, OLEG ALEKSANDROVICH, candidate of technical sciences, dotsent; and SEMENOV, VALERIY VALENTINOVICH, engineer, both of Chelyabinsk Polytechnic Institute

[Abstract] A memory device is described which can store data over long periods of time, useful in automatic regulators of compensation of capacitive currents. It is built with microcircuit components: K155TM2 counting trigger with NAND logic, K155TM2 D-trigger, K1551Ye7 reversible counter, 252PA2 high-precision digital-to-analog converter, K140UD8 operational scaling amplifier, and 521SA2 comparator. The counter allows overflow till reversal in either of its extreme states of logic "1" or logic "0" at all information outputs, when the input voltage reaches or exceeds the limit of its permissible 0-5 V range. The device features a higher level of circuit integration, with attendant greater structural simplicity and thus higher reliability, than its predecessor (O. A. Petrov and V. I. Girya, ELEKTROMEKHANIKA, 1976). Because of the use of a high-precision digital-to-analog converter instead of plain discrete resistors, it is also more accurate with an error of 0.02 V when using an 8-digit counter. Fadeout of the supply voltage results in loss of stored data, but subsequent recovery of the supply voltage immediately restores the device for operation. Coincidence of such a fadeout and appearance of a recording signal is very rare, however, so that the reliability is still very high. The device has been operating for several years in the Tol'yatti TETs and in the Sokolovo-Sarbaynsk mining and ore enriching combine, automatically regulating the compensation of capacitive single-phase-to-ground fault currents. Figures 1; references: 6 Russian.
[299-2415]

GENERALIZED INDICATORS OF ELECTROMAGNETIC COMPATIBILITY FOR RADIOELECTRONIC EQUIPMENT

Moscow RADIOTEKHNIKA in Russian No 7, Jul 83 (manuscript received, after completion, 6 Jan 83) pp 26-28

SHVARTSMAN, A. R.

[Abstract] Three indicators are considered for characterizing the electromagnetic compatibility of radioelectronic equipment which consists of an interference transmitter and receiver. The first indicator, related to frequency separation between transmitter and receiver, is the full frequency range off limits to the channel linking a given unit of radioelectronic equipment and its antipode. The second indicator, related to space diversity of transmitter and receiver, is the area or volume off limits to the antipodes of a given unit of radioelectronic equipment. The third indicator, related to time diversity, is the fraction of time available to operation of both a given unit of radioelectronic equipment and its antipode. All three indicators, always functionally interrelated, are defined in a spherical system of coordinates in a generalized form so as to be applicable to any specific radiator geometry and array configuration. The compatibility of a receiver is determined by the power and the radiation characteristics of the transmitter. The compatibility of a transmitter is determined by the sensitivity of the receiver, amplitude-frequency and phase-frequency characteristics of its amplifier, and the parameters of its demodulator and of the incoming signal. These relations can serve as a basis for design optimization with respect to electromagnetic compatibility, namely minimization of its indicators under given operating conditions. References: 7 Russian.
[302-2415]

FREQUENCY MULTIPLICATION BY SCHOTTKY-BARRIER DIODES ON SHORT SIDE OF MILLIMETRIC RANGE OF WAVELENGTHS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 28 Oct 81) pp 1666-1668

AVERIN, S. V., GRUSHA, S. A., LYUBCHENKO, V. Ye., MASLOVSKIY, F. N. and NOVITSKIY, V. A.

[Abstract] A frequency doubler built with a Schottky-barrier diode is described, its structure constituting an array of densely spaced junctions on an n-GaAs surface with a protective dielectric layer. The device includes a waveguide for pumping, a signal waveguide, a pickup pin, a tuning plunger, and a bias circuit. An experimental model was produced by first masking the epitaxial structure with a 0.6-0.8 μm thick SiO_2 film, then cutting windows 2-10 μm in diameter in that film by the standard photolithographic process, growing a 0.3-0.4 μm thick platinum barrier in each window by vacuum deposition, refining the structure to 20-25 μm thickness by mechanical grinding and subsequent chemical etching of the substrate, and growing an ohmic contact tab on the back side by electro-chemical deposition of 0.6 μm thick lead and gold layers. Performance measurements included the dependence of the output power with various diameters of the contact area and correspondingly different series resistances, and its dependence on the bias voltage at various levels of pumping power. The results reveal that, for optimum performance, reducing the series resistance is more important than reducing the barrier capacitance and that the optimum bias at high pumping levels is in the negative range with the non-linear capacitance the governing factor. The maximum signal obtained at 124 GHz, with a 3 μm contact diameter, was 400 μW with a 15 dB second-harmonic conversion loss. The authors thank Yu. V. Gulyayev for attention to the work and helpful discussion. Figures 3; references 5: 2 Russian, 3 Western.
[2-2415]

OPTOELECTRONIC MEANS OF SUPPLYING INFORMATION TO POWER PLANT INSPECTION AND CONTROL SYSTEMS

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 6, Jun 83 (manuscript received 5 Apr 82) pp 3-11

UDALOV, N. P., doctor of technical sciences, professor, and BUSURIN, V. I., candidate of technical sciences, Order of Lenin and Order of October Revolution Moscow Institute of Aviation imeni S. Ordzhonikidze

[Abstract] Introduction of optoelectronics into inspection and control systems for power plants has been stimulated by the development of fiber optics as a reliable and economic means of automatic data transmission. The sensing element of transducers is still the least standardized and, consequently, the most problematic component of such a data transmission system. This review covers design and performance characteristics of sensing elements from the standpoint of requirements for the remainder of the 1981-85 period and the subsequent 1986-90 period. For the purpose of this review, sensing elements which operate with controllable light guides have been classified according to the physical input quantities (electrical, magnetic, optical, mechanical, acoustic, thermal) and the corresponding transducer mechanisms as well as the primary variable parameters such as the refractive index n , birefringence $n_o - n_e$, area of optical contact S , gap width d , extinction coefficient K , and intermediate parameters such as reflection coefficient and transmission coefficient at the fiber-medium interface which influence and control the optical output radiation. Parameters of the optical output radiation recordable by a photoreceiver are amplitude, plane of polarization, direction (angle) of propagation, and spectral characteristics (wavelength). Basic relations are given for a controlled optron, a radiation source and a photoreceiver directly connected through optical fibers, using various modulation schemes. Light absorption by the fiber material is assumed to be negligible and the light source is assumed to have a broad radiation pattern, for calculation of the performance characteristics. Figures 2; tables 1; references 7: 6 Russian, 1 Western (in Russian translation). [301-2415]

UDC 621.372.8.029.7

PROPAGATION OF SURFACE WAVES THROUGH PLANE GRADIENTAL WAVEGUIDES WITH IRREGULAR SEGMENT

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 23 Nov 81, after correction 11 Oct 82) pp 1495-1502

RUDENOK, I. P.

[Abstract] The propagation of surface waves through a finite irregular segment of a plane gradiental dielectric waveguide is analyzed theoretically, assuming either deterministically or stochastically deformed boundaries. Consideration is given to transformation of surface waves into other surface waves, the discrete spectrum and the continuous spectrum, wave scattering and back-scattering, as well as radiation. The corresponding normalized power losses are calculated as functions of the normalized waveguide dimension and correlation interval. Figures 3; references 14: 8 Russian, 6 Western (1 in Russian translation).
[2-2415]

UDC 621.376.029.6:539.216.2

MICROWAVE MODULATOR WITH MDS-STRUCTURE WITH InSb FILMS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 12 Feb 82) pp 1671-1673

GUSAKOV, V. V. and KATS, L. I.

[Abstract] A microwave modulator is considered as a possible application for MDS structures with InSb single-crystal layers, because of the conducting space-charge region near the surface of such a structure with sharply bent energy bands. The performance of this device is analyzed theoretically, considering the interaction of an electromagnetic wave and charge carriers in the space-charge layer. Calculations are based on the one-dimensional Poisson equation for a nondegenerate intrinsic semiconductor and the corresponding carrier (electron) concentration profile. The effect of normal incidence of an electromagnetic wave on a thin nonhomogeneous plasma layer is evaluated

in the hydro-dynamic approximation, with scattering of charge carriers by the surface disregarded/ The results indicate that both the reflection coefficient and the absorption coefficient of the space-charge layer change appreciably as the dimensionless surface potential $v_s = \frac{e}{kT} v_{s0}$ increases. The feasibility of such a modulator has been established experimentally with an InSb thin films (500-600 Å), this material combining optimum technological characteristics with low initial losses (1-2 dB) and attainability of large modulation factors ($m = 0.3$) at signal frequencies up to 10^5 Hz. The authors thank A. G. Veselov and N. I. Sinitsyn for providing the facilities for producing InSb films by the technology they have developed, as well as B. A. Murmuzhev and Ye. F. Ushatkin for helpful discussions. Figures 3; references: 5 Russian. [2-2415]

CODE LOCK BUILT WITH MICROCIRCUITS

Moscow RADIO in Russian No 8, Aug 83 pp 24-25

KALMYKOV, B., Ryazan

[Abstract] A code lock is described which has been built with integrated microcircuits. It consists of an array of nine pushbuttons, one door knob, one code setting plug, four coincidence circuits and four triggers, one two-transistor switch, one electromagnet, and one indicator light. The lock is controlled according to a 5-digit code with only three pushbuttons used as the "key", two buttons being pressed twice each. The power supply for this lock contains a 230/10 V - 50 Hz power transformer delivering 8 W at 8-10 V, a bridge rectifier, and the simplest version of a voltage stabilizer. The lock is small and draws little power, it is also highly reliable and vibration-proof. Because its components are under line voltage, it must be set up in accordance with safety rules. Using a larger power transformer with an additional step-down secondary feeding the low-voltage electromagnet, also through a low-voltage transistor, will reduce the danger of shock. Figures 3. [3-2415]

PERFORMANCE AND SERVICE INDICATORS OF 110-750 kV SUBSTATIONS IN USSR POWER SYSTEMS

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 6, Jun 83 (manuscript received 23 Sep 82) pp 22-27

OVSEYCHUK, V. A., candidate of technical sciences, and SHESTEREN', V. Ye., candidate of technical sciences, All-Union State Planning, Surveying Institute and Scientific Research Institute of Power Systems and Electric Power Networks, Kazakh and Belorussian departments

[Abstract] For the purpose of performance and service analysis, step-down substations of 49 power systems in the USSR were surveyed with a breakdown into three major geographical regions: 1) European, 2) Ural - Kazakhstan - Central Asia, 3) Siberia. The 419 substations in this survey constitute a large-size 90% sample of all 400-750 kV substations, a medium-size 25% sample of all 220-330 kV substations, and a small-size 5% sample of all 110 kV substations. The operating data were segregated on a seasonal basis into winter data and summer data. From the respective daily kW and kVAR load curves have been extracted the probability and statistical characteristics, with resulting regression equations, necessary for evaluating the present operation as well as for further planning and design. Figures 1; tables 4; references: 3 Russian. [301-2415]

UDC 621.373.5:534.8.001.5.(021.4)(045)

CONTROLLED GENERATOR OF ULTRASONIC-FREQUENCY SIGNALS

Novocherkassk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 7, Jul 83 (manuscript initially received 3 Dec 81, after completion 5 Apr 82) pp 78-81

RYAZANOV, BORIS PETROVICH, candidate of technical sciences, acting dotsent; and BYSTROVA, INNA DMITRIYEVNA, engineer. Both of Moscow Institute of Power Engineering, Smolensk branch

[Abstract] A low-power controlled oscillator is synthesized for use in a generator of ultrasonic waves. Its prototype is a self-excited wideband multivibrator built with microcircuit components including transistor-transistor logic, with a few simplifications permissible because of the relatively narrow practical range of frequency regulation. The bistable multivibrator consists of two transistors, with five resistors and a capacitor in the circuit, to which two NAND gates and a D-trigger in counting mode are added. The multivibrator generates asymmetric oscillations, but the trigger ensures exactly equal half-periods at an invariable frequency and also halves that frequency. The general procedure for synthesis with many mutually independent components is very unwieldy, but becomes manageable with constraints imposed on the ranges of voltage variation and components variability. Typical transistors used for the multivibrator have a current gain $\beta \geq 50$, an input resistance $r_{in} - 300$ ohms, and an open-circuit emitter-base voltage $V_{EBO} \approx 0.7$ V. Such an ultrasonic-frequency generator, built with KT315 transistors and K155LA3 (microcircuit) logic, was tested at the Roslavl' diamond tool manufacturing plant. Although half the size of the generator now used, it has the same power characteristics and produces diamond tools of the same quality. Figures 2; references: 1 Russian.
[299-2415]

NEW ACTIVITIES, MISCELLANEOUS

UDC 621.311.25:621.039.004.6

CHANGE IN PARAMETERS OF MEDIUM INSIDE NUCLEAR REACTOR CONTAINMENT UPON INRUSH OF COOLANT

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 6, Jun 83 (manuscript received 12 Apr 82) pp 59-63

FISENKO, V. V., doctor of technical sciences, professor, ALFEROV, A. V., candidate of technical sciences, dotsent, and TOSHEVA, V. V., engineer, Order of Labor Red Banner Odessa Polytechnical Institute

[Abstract] A method is proposed for calculating the change in parameters of the medium inside a reactor containment upon inrush of water vapor which mixes here with ambient air. The method is simpler than the ZOCO-V program (NUCLEAR ENGINEERING Vol 23, 1972, pp 239-272) and the "Vsplesk" program (All-Union Institute of Heat Engineering). It assumes that at the instant of pipe rupture in the main circulation loop, the containment is filled with air at nearby atmospheric pressure. The subsequent process of air and vapor mixing is subdivided into four stages: 1) Leaking coolant (water) expands and evaporates during a period of 0.2-0.3 s, and the mass of air increases through leakage from outside but its partial pressure drops while that of vapor rises; 2) Both temperature and pressure of mixture rise; 3) Pressure rises further with eventual ejection of air-vapor mixture from containment; and 4) Pressure drops sharply after activation of sprinklers. Calculations for each stage are based on the corresponding equations of mass and energy balance, with equations of state for each component closing the system. The rates of change of temperature and pressure, with thermal expansivity and isothermal compressibility taken into account, are determined first using the acoustic velocity and the Gruneisen coefficient (ratio of potential pressure energy to increment of internal energy in isochoric process) with its temperature dependence at thermodynamic equilibrium. Corrections are then made for thermodynamic nonequilibrium caused by sprinkler operation and vapor condensation. Figures 3; references 3: 1 Russian, 2 Western.
[301-2415]

MECHANISMS OF FLICKER NOISE IN JOSEPHSON JUNCTIONS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 28 Apr 82) pp 1668-1670

VYSTAVKIN, A. N., GUBANKOV, V. N. and TARASOV, M. A.

[Abstract] Flicker noise with an $1/f$ -spectrum in Josephson-junction detector and superheterodyne radiometers was studied experimentally in order to determine the cutoff frequency and for better understanding of the fluctuation mechanisms. Measurements were made on UNIPAN-233.5/6 preamplifiers and a UNIPAN-237 amplifier which also acted as a spectrum analyzer, all low-noise instruments including stages with P28 bipolar transistors, KP303 field-effect transistors, or 6Zh52 low-noise pentodes. Shot noise was eliminated by appropriate mismatching of successive stages. Thermal noise was eliminated by adequate cooling of the matched transformer which served as the signal source. The results indicate that helium bubbles at the liquid-gas interphase boundary and temperature fluctuations in liquid helium contribute to the low-frequency noise only when the boiling intensity is high. The cutoff frequency of flicker noise does not exceed 5 kHz, the Voss-Clarke-Hawkins model (PHYS. REV. B Vol 13 and Vol 14, 1976) for Josephson tunnel structures also yielding accurate results for Josephson superconducting point-junctions. Figures 2; references 8: 4 Russian, 4 Western (1 in Russian translation).
[2-2415]

EIGHTEENTH ALL-UNION CONFERENCE ON EMISSION ELECTRONICS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 28, No 8, Aug 83
(manuscript received 27 Jul 82) pp 1675-1676

KORABLEV, V. V.

[Abstract] The 18th All-Union Conference on emission electronics was held 8-11 December 1981 in Moscow. It was organized by the Science Council to the USSR Academy of Sciences on problems of "physical electronics", the Academy's Institute of Radio Engineering and Electronics, and the USSR Ministry of Higher and Secondary Specialized Education. The papers, presented in 16 plenary sessions, mostly dealt with basic research in surface physics and emission processes. Other topics included emission spectroscopy and utilization of secondary-electron, photoelectron, and ion emission, as well as exoemission. The results of both theoretical and experimental studies were reported, revealing significant progress and achievements since the previous conference in terms of fundamental insight and practical applications.
[2-2415]

FOR THE HUNGARIAN PEOPLE'S ARMY

Moscow RADIO No 8, Aug 83 pp 23-24

KISS, LAIOS, Major General, General Secretary of Hungarian Joint Chiefs of Staff (Oboronnogo Soyuza), Budapest

[Abstract] A major task of the Hungarian Armed Forces is to prepare the youth of that country for military service, including work in the Communications Corps. This means early training, beginning at the age of 12-14, in radio hamming as a hobby and as an educational process. This is done in clubs and in seminars with communication specialists, through projects, competitions, and other related activities. Great help is being received from the fraternal All-Union (USSR) Voluntary Society for Cooperation with the USSR Army, Air Force and Navy. A close contact, with a creative exchange of knowledge, is maintained with similar paramilitary and hobby organizations in other socialist countries of the Warsaw Pact. This was demonstrated at the 31st All-Union Exhibition of Radio Hamming and Engineering in Moscow.

[3-2415]

CSO: 1860

- END -